DECISION DOCUMENT

27-09 40th Avenue
Brownfield Cleanup Program
Long Island City, Queens County
Site No. C241241
May 2021

Prepared by
Division of Environmental Remediation
New York State Department of Environmental Conservation

DECLARATION STATEMENT - DECISION DOCUMENT

27-09 40th Avenue
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May 2021

Statement of Purpose and Basis

This document presents the remedy for the 27-09 40th Avenue site, a brownfield cleanup site. The remedial program was chosen in accordance with the New York State Environmental Conservation Law and Title 6 of the Official Compilation of Codes, Rules and Regulations of the State of New York (6 NYCRR) Part 375.

This decision is based on the Administrative Record of the New York State Department of Environmental Conservation (the Department) for the 27-09 40th Avenue site and the public's input to the proposed remedy presented by the Department.

Description of Selected Remedy

The elements of the selected remedy are as follows:

1. Remedial Design

A remedial design program will be implemented to provide the details necessary for the construction, operation, optimization, maintenance, and monitoring of the remedial program. Green remediation principles and techniques will be implemented to the extent feasible in the design, implementation, and site management of the remedy as per DER-31. The major green remediation components are as follows:
remediation components are as follows:

- Considering the environmental impacts of treatment technologies and remedy stewardship over the long term;
- Reducing direct and indirect greenhouse gases and other emissions;
- Increasing energy efficiency and minimizing use of non-renewable energy;
- Conserving and efficiently managing resources and materials;
- Reducing waste, increasing recycling and increasing reuse of materials which would otherwise be considered a waste;
- Maximizing habitat value and creating habitat when possible;
- Fostering green and healthy communities and working landscapes which balance ecological, economic and social goals;
- Integrating the remedy with the end use where possible and encouraging green and sustainable re-development; and

- Additionally, to incorporate green remediation principles and techniques to the extent feasible in the future development at this site, any future on-site buildings will include, at a minimum, a 20-mil vapor barrier/waterproofing membrane on the foundation to improve energy efficiency as an element of construction.

2. Excavation

Excavation and off-site disposal of contaminant source areas, including**:**

- soils which exceed the protection of groundwater soil cleanup objectives (PGWSCOs), as defined by 6 NYCRR Part 375-6.8 for those contaminants found in site groundwater above standards; and;
- soils that create a nuisance condition, as defined in Commissioner Policy CP-51 Section G.

Excavation and off-site disposal of all on-site soils which exceed unrestricted SCOs, as defined by 6 NYCRR Part 375-6.8. If a Track 1 cleanup is achieved, a Cover System will not be a required element of the remedy.

Excavation and removal of any underground storage tanks (USTs), fuel dispensers, underground piping or other structures associated with a source of contamination.

Approximately 4,500 cubic yards of contaminated soil will be removed from the site. This includes removal of the top 4 feet of contaminated soil site-wide and individual hot spots that range from 7 feet below ground surface (bgs) to 36 feet bgs. In addition, soil will be excavated to 25 feet bgs site-wide for development purposes.

3. Backfill

On-site soil which does not exceed the above excavation criteria or the protection of groundwater SCOs for any constituent may be used anywhere beneath the cover system, including below the water table, to backfill the excavation or re-grade the site.

Additionally, clean fill meeting the requirements of 6 NYCRR Part 375-6.7(d) may be brought in to replace the excavated soil or complete the backfilling of the excavation and establish the designed grades at the site.

4. Soil Vapor Extraction (SVE)

Soil vapor extraction (SVE) will be implemented to remove volatile organic compounds (VOCs) from the subsurface and to prevent vapors migrating off site. VOCs will be physically removed from the soil by applying a vacuum to wells that have been installed into the vadose zone (the area below the ground but above the water table). The vacuum draws air through the soil matrix which carries the VOCs from the soil to the SVE well. The air extracted from the SVE wells is then treated as necessary prior to being discharged to the atmosphere. The remedial design details of the SVE system (number of wells, screen length, discharge control) will be developed and submitted for Department approval.

5. In-Situ Chemical Reduction

In-situ chemical reduction will be implemented to treat VOCs in groundwater. Zero valent iron will be directly added to the bottom of the excavation at the groundwater interface to address groundwater contamination at source areas. Zero-valent iron will also be injected into the subsurface to form a vertical permeable reactive barrier (PRB) near the downgradient boundary of the site to destroy contaminants leaving the site. The method and depth of injection will be determined during the remedial design.

Monitoring of VOCs will be required and conducted in the former source areas, and upgradient and downgradient of the PRB located near the downgradient boundary of the site.

6. In-Situ Chemical Oxidation

In-situ chemical oxidation (ISCO) will be implemented to treat VOCs in groundwater. A chemical oxidant, sodium permanganate, will be injected into the subsurface to destroy the contaminants in two transects located near the northern border of the site where PCE is elevated in the groundwater. The method and depth of injection will be determined during the remedial design. Additional data will be collected during design development.

Prior to the full implementation of this technology, additional laboratory scale studies (soil oxidant demand) will be conducted and additional geochemical data will be collected to more clearly define design parameters.

7. Vapor Mitigation

Any on-site buildings will be required to have a sub-slab depressurization system, or other acceptable measures, to mitigate the migration of vapors into the building from the subsurface. Since this is expected to be a BCP Conditional Track 1 cleanup, the system and any vapor intrusion monitoring must no longer be needed within 5 years of the date of the Certificate of Completion or the remedy would result in a Track 4 Restricted Residential cleanup.

8. Local Institutional Controls

If no EE or SMP is needed to achieve soil, groundwater, or soil vapor remedial action objectives, then the following local use restriction will be relied upon to prevent ingestion of groundwater: Article 141 of the NYCDOH code, which prohibits potable use of groundwater without prior approval.

Conditional Track 1

The intent of the remedy is to achieve a Track 1 unrestricted use, therefore, no environmental easement or site management plan is anticipated. If the soil vapor intrusion (SVI) evaluation is not completed prior to completion of the Final Engineering Report, then a Site Management Plan (SMP) and Environmental Easement (EE) will be required to address the SVI evaluation and implement actions as needed; if a mitigation or monitoring action is needed, a Track 1 cleanup can

only be achieved if the mitigation system or other required action is no longer needed within 5 years of the date of the Certificate of Completion (COC).

In the event that Track 1 unrestricted use is not achieved, including achievement of groundwater and soil vapor remedial objectives, the following contingent remedial elements will be required and the remedy will achieve a Track 4 restricted residential cleanup.

Contingent Remedial Elements

9. Cover System

A site cover will be required to allow for restricted residential use of the site in areas where the upper two feet of exposed surface soil will exceed the applicable soil cleanup objectives (SCOs). Where a soil cover is to be used it will be a minimum of two feet of soil placed over a demarcation layer, with the upper six inches of soil of sufficient quality to maintain a vegetative layer. Soil cover material, including any fill material brought to the site, will meet the SCOs for cover material for the use of the site as set forth in 6 NYCRR Part 375-6.7(d). Substitution of other materials and components may be allowed where such components already exist or are a component of the tangible property to be placed as part of site redevelopment. Such components may include, but are not necessarily limited to pavement, concrete, paved surface parking areas, sidewalks, building foundations and building slabs.

10. Institutional Control

Imposition of an institutional control in the form of an environmental easement for the controlled property which will:

- require the remedial party or site owner to complete and submit to the Department a periodic certification of institutional and engineering controls in accordance with Part 375-1.8 (h)(3);
- allow the use and development of the controlled property for restricted residential use as defined by Part 375-1.8(g), although land use is subject to local zoning laws;
- restrict the use of groundwater as a source of potable or process water, without necessary water quality treatment as determined by the NYSDOH or NYCDOH; and
- require compliance with the Department approved Site Management Plan.

11. Site Management Plan

A Site Management Plan is required, which includes the following:

1. An Institutional and Engineering Control Plan that identifies all use restrictions and engineering controls for the site and details the steps and media-specific requirements necessary to ensure the following institutional and/or engineering controls remain in place and effective:

   Institutional Controls: The environmental easement described in paragraph 10 above.

Engineering Controls: The soil vapor extraction (paragraph 4), sub-slab depressurization system (paragraph 7) and cover system (paragraph 9) described in the paragraphs noted above.

This plan includes, but may not be limited to:

- an Excavation Plan which details the provisions for management of future excavations in areas of remaining contamination;
- descriptions of the provisions of the environmental easement including any land use and groundwater use restrictions;
- a provision that should a building foundation or building slab be removed in the future, a cover system will be placed in any areas where the upper two feet of exposed surface soil exceed the applicable soil cleanup objectives (SCOs);
- provisions for the management and inspection of the identified engineering controls;
- maintaining site access controls and Department notification; and
- the steps necessary for the periodic reviews and certification of the institutional and/or engineering controls.

2. a Monitoring Plan to assess the performance and effectiveness of the remedy. The plan includes, but may not be limited to:
   - monitoring of groundwater and soil vapor to assess the performance and effectiveness of the remedy;
   - a schedule of monitoring and frequency of submittals to the Department;

3. an Operation and Maintenance (O&M) Plan to ensure continued operation, maintenance, optimization, monitoring, inspection, and reporting of any mechanical or physical components of the remedy. The plan includes, but is not limited to:
   - procedures for operating and maintaining the remedy;
   - compliance monitoring of treatment systems to ensure proper O&M as well as providing the data for any necessary permit or permit equivalent reporting;
   - maintaining site access controls and Department notification; and
   - providing the Department access to the site and O&M records.

Declaration

The remedy conforms with promulgated standards and criteria that are directly applicable, or that are relevant and appropriate and takes into consideration Department guidance, as appropriate. The remedy is protective of public health and the environment.

May 26, 2021
Date

Gerard Burke, Bureau Director
Remedial Bureau B

DECISION DOCUMENT

27-09 40th Avenue
Long Island City, Queens County
Site No. C241241
May 2021

SECTION 1: SUMMARY AND PURPOSE

The New York State Department of Environmental Conservation (the Department), in consultation with the New York State Department of Health (NYSDOH), has selected a remedy for the above referenced site. The disposal of contaminants at the site has resulted in threats to public health and the environment that would be addressed by the remedy. The disposal or release of contaminants at this site, as more fully described in this document, has contaminated various environmental media. Contaminants include hazardous waste and/or petroleum.

The New York State Brownfield Cleanup Program (BCP) is a voluntary program. The goal of the BCP is to enhance private-sector cleanups of brownfields and to reduce development pressure on "greenfields." A brownfield site is real property, the redevelopment or reuse of which may be complicated by the presence or potential presence of a contaminant.

The Department has issued this document in accordance with the requirements of New York State Environmental Conservation Law and 6 NYCRR Part 375. This document is a summary of the information that can be found in the site-related reports and documents.

SECTION 2: CITIZEN PARTICIPATION

The Department seeks input from the community on all remedies. A public comment period was held, during which the public was encouraged to submit comment on the proposed remedy. All comments on the remedy received during the comment period were considered by the Department in selecting a remedy for the site. Site-related reports and documents were made available for review by the public at the following document repositories:

DECInfo Locator - Web Application
https://gisservices.dec.ny.gov/gis/dil/index.html?rs=C241241

Queens Library at Long Island City
37-44 21st Street
Long Island City, NY 11101

Queens Community Board 1
45-02 Ditmars Boulevard
LL Suite 1025
Astoria, NY 11105

Receive Site Citizen Participation Information By Email

Please note that the Department's Division of Environmental Remediation (DER) is "going paperless" relative to citizen participation information. The ultimate goal is to distribute citizen participation information about contaminated sites electronically by way of county email listservs. Information will be distributed for all sites that are being investigated and cleaned up in a particular county under the State Superfund Program, Environmental Restoration Program, Brownfield Cleanup Program and Resource Conservation and Recovery Act Program. We encourage the public to sign up for one or more county listservs at http://www.dec.ny.gov/chemical/61092.html

SECTION 3: SITE DESCRIPTION AND HISTORY

Location: The 27-09 40th Avenue Site is located in Long Island City, and consists of three separate, contiguous parcels with addresses of 27-03 40th Avenue, 27-09 and 27-11 40th Avenue, and 39-44 28th Street. The three lots total 0.4 acres.

Site Features: The site is currently vacant. The three 1-story commercial buildings at the site were demolished in March 2020. The building at 39-44 28th Street had a partial basement in the northeastern portion of the property; the other buildings were slab-on-grade.

Current Zoning and Land Use: The current zoning designation for the site is M1-2/R5D, allowing for mixed residential, community facility, commercial, and light industrial uses. The site is bounded by 40th Avenue to the south; 28th Street to the east; and residential buildings to the north and west.

Past Use of the Site: Prior to 1936, residential buildings were at the site. Two of the site parcels were developed in 1947 (29-44 28th Street) and 1950 (27-09/27-11 40th Avenue). The western parcel (27-03 40th Avenue) was developed by 1970. Historic uses include an auto body shop (1977-2006) at 27-03 40th Avenue; a dry cleaning facility (2005-2019), auto sales (1991-2005), a woodworking shop (2005-2017), and a scientific glass factory (1950-1991) at 27-09/27-11 40th Avenue; and a photoengraving shop (1947-2006), auto repair facility (2000-2005) and a machine shop (2014-2019) at 29-44 28th Street.

Site Geology and Hydrogeology: Contaminated historic fill material is underlain by layers of fine to medium silty sands and silt which overlie thick, competent, plastic clay. The historic fill layer is 0-2 feet thick, with one location containing fill up to 5 feet thick. Silty sands and silt are found to approximately 30 feet below grade surface(bgs). The clay layer is present at 31 to 36 ft bgs, with the top of clay shallower in the east and trending deeper to the west. At MW-107, in the southeast portion of the site, the clay layer was found at 19-22 feet. A geotechnical investigation identified clay layers between 35 and 60 feet bgs.. The groundwater flow direction is generally

toward the west-southwest. The depth to groundwater is approximately 35 feet bgs.

A site location map is attached as Figure 1.

SECTION 4: LAND USE AND PHYSICAL SETTING

The Department may consider the current, intended, and reasonably anticipated future land use of the site and its surroundings when evaluating a remedy for soil remediation. For this site, alternatives (or an alternative) that restrict(s) the use of the site to restricted-residential use (which allows for commercial use and industrial use) as described in Part 375-1.8(g) were/was evaluated in addition to an alternative which would allow for unrestricted use of the site.

A comparison of the results of the Remedial Investigation (RI) to the appropriate standards, criteria and guidance values (SCGs) for the identified land use and the unrestricted use SCGs for the site contaminants is available in the RI Report.

SECTION 5: ENFORCEMENT STATUS

The Applicant under the Brownfield Cleanup Agreement is a Volunteer. The Volunteer does not have an obligation to address off-site contamination. The Department has determined that this site poses a significant threat to human health and the environment and there are off-site impacts that require remedial activities; accordingly, enforcement actions are necessary.

The Department will seek to identify any parties (other than the Volunteer(s)) known or suspected to be responsible for contamination at or emanating from the site, referred to as Potentially Responsible Parties (PRPs). The Department will bring an enforcement action against the PRPs. If an enforcement action cannot be brought, or does not result in the initiation of a remedial program by any PRPs, the Department will evaluate the off-site contamination for action under the State Superfund. The PRPs are subject to legal actions by the State for recovery of all response costs the State incurs or has incurred.

SECTION 6: SITE CONTAMINATION

6.1: Summary of the Remedial Investigation

A remedial investigation (RI) serves as the mechanism for collecting data to:

- characterize site conditions;
- determine the nature of the contamination; and
- assess risk to human health and the environment.

The RI is intended to identify the nature (or type) of contamination which may be present at a site and the extent of that contamination in the environment on the site, or leaving the site. The RI reports on data gathered to determine if the soil, groundwater, soil vapor, indoor air, surface water or sediments may have been contaminated. Monitoring wells are installed to assess groundwater and soil borings or test pits are installed to sample soil and/or waste(s) identified. If other natural

resources are present, such as surface water bodies or wetlands, the water and sediment may be sampled as well. Based on the presence of contaminants in soil and groundwater, soil vapor will also be sampled for the presence of contamination. Data collected in the RI influence the development of remedial alternatives. The RI report is available for review in the site document repository and the results are summarized in section 6.3.

The analytical data collected on this site includes data for:

- groundwater
- soil
- soil vapor

6.1.1: Standards, Criteria, and Guidance (SCGs)

The remedy must conform to promulgated standards and criteria that are directly applicable or that are relevant and appropriate. The selection of a remedy must also take into consideration guidance, as appropriate. Standards, Criteria and Guidance are hereafter called SCGs.

To determine whether the contaminants identified in various media are present at levels of concern, the data from the RI were compared to media-specific SCGs. The Department has developed SCGs for groundwater, surface water, sediments, and soil. The NYSDOH has developed SCGs for drinking water and soil vapor intrusion. For a full listing of all SCGs see: http://www.dec.ny.gov/regulations/61794.html

6.1.2: RI Results

The data have identified contaminants of concern. A "contaminant of concern" is a contaminant that is sufficiently present in frequency and concentration in the environment to require evaluation for remedial action. Not all contaminants identified on the property are contaminants of concern. The nature and extent of contamination and environmental media requiring action are summarized below. Additionally, the RI Report contains a full discussion of the data. The contaminant(s) of concern identified at this site is/are:

tetrachloroethene (PCE)	lead
trichloroethene (TCE)	mercury
benzo(a)anthracene	barium
benzo(a)pyrene	copper
4,4’ DDT	zinc
dieldrin	

The contaminant(s) of concern exceed the applicable SCGs for:

- soil
- groundwater

6.2: Interim Remedial Measures

An interim remedial measure (IRM) is conducted at a site when a source of contamination or exposure pathway can be effectively addressed before issuance of the Decision Document.

There were no IRMs performed at this site during the RI.

6.3: Summary of Environmental Assessment

This section summarizes the assessment of existing and potential future environmental impacts presented by the site. Environmental impacts may include existing and potential future exposure pathways to fish and wildlife receptors, wetlands, groundwater resources, and surface water. The RI report presents a detailed discussion of any existing and potential impacts from the site to fish and wildlife receptors.

Nature and Extent of Contamination: Various investigations have occurred at the site since 2008. The investigation results are described below:

Soil and groundwater were analyzed for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), metals, polychlorinated biphenyls (PCBs), pesticides, and the emerging contaminants per- and poly-fluoroalkyl substances (PFAS) and 1,4-dioxane. Soil vapor was analyzed for VOCs. The primary contaminants at this site are metals and chlorinated VOCs.

Soil - Lead in soil ranges up to 767 parts per million (ppm), compared to the unrestricted use soil cleanup objectives (UUSCO) of 63 ppm. Other metals exceed unrestricted SCOs (UUSCO) in the top two feet of soil including mercury, barium, copper and zinc. Semi-volatile organic compounds (SVOCS) including benzo(a)anthracene and benzo(a)pyrene exceeded the UUSCO in the top two feet of soil. Two pesticides (4,4'-DDT and dieldrin) slightly exceeded UUSCOs at the site. Tetrachloroethylene (PCE), commonly used in dry cleaning, was detected in soil at up to 30 ppm, at 3-5 feet below grade. PCE was also found at depths ranging to 27 feet. Since PCE is also found in groundwater, the protection of groundwater soil cleanup of objective (PGSCO) of 1.3 ppm is used for comparison.

Data does not indicate any off-site soil impacts related to this site.

Groundwater- Samples were obtained from five on-site wells. All contained PCE, ranging from 170-400 parts per billion (ppb), compared to the ambient water quality standard (AWQS) of 5 ppb. Four wells placed in sidewalks proximate to the site contained PCE at 11 to 67 ppb. Chloroform was measured at 8.5 ppb compared to the AWQS of 7 ppb.

For PFAS, perflurooctanoic acid (PFOA) was reported at a concentration of 3.28 parts per trillion (ppt) and perfluorooctanoic sulfonic acid (PFOS) was not detected. Both were below the Maximum Contaminant Level (drinking water standard) of 10 ppt in groundwater.

1,4 dioxane was reported at concentrations of up to 3.12 parts per billion (ppb) exceeding the Maximum Contaminant Level (drinking water standard) of 1 ppb in groundwater.

Off-site groundwater downgradient of the site contains PCE at 67 ppb, compared to the ambient water quality standard (AWQS) of 5 ppb, indicating off-site migration from the site.

Soil Vapor - Soil vapor samples were collected at 25 feet below grade at 7 locations across the site in 2019. Soil vapor contained PCE and trichloroethylene (TCE). The maximum amount of PCE measured was 1,600,000 micrograms per cubic meter (µg/m3) and the maximum TCE concentration was 4800 ug/m3. Follow-up sampling in 2020 showed PCE up to 270,000 and TCE up to 1200 ug/m3. Off-site values ranged from 180-920 ug/m3 of PCE and 2.3-29 ug/m3 of TCE. These values require further off-site investigation.

Data indicates off-site impacts in soil vapor related to this site. The Department performed limited off-site structural soil vapor intrusion sampling in January 2021. One off-site structure has been offered a mitigation system and one structure requires monitoring only.

6.4: Summary of Human Exposure Pathways

This human exposure assessment identifies ways in which people may be exposed to site-related contaminants. Chemicals can enter the body through three major pathways (breathing, touching or swallowing). This is referred to as *exposure.*

The site is fenced so people are not expected to come into contact with contaminated soil on the site. People are not drinking the contaminated groundwater because the area is served by a public water supply that is not affected by this contamination. Volatile organic compounds in soil vapor (air spaces within the soil) may move into buildings and affect the indoor air quality. This process, which is similar to the movement of radon gas from the subsurface into the indoor air of buildings, is referred to as soil vapor intrusion (SVI). The site is vacant so inhalation of site contaminants in indoor air via soil vapor intrusion is not a current concern. However, the potential exists for inhalation of site contaminants due to soil vapor intrusion both offsite and for any future onsite development.

6.5: Summary of the Remediation Objectives

The objectives for the remedial program have been established through the remedy selection process stated in 6 NYCRR Part 375. The goal for the remedial program is to restore the site to pre-disposal conditions to the extent feasible. At a minimum, the remedy shall eliminate or mitigate all significant threats to public health and the environment presented by the contamination identified at the site through the proper application of scientific and engineering principles.

The remedial action objectives for this site are:

Groundwater

RAOs for Public Health Protection

- Prevent ingestion of groundwater with contaminant levels exceeding drinking water standards.
- Prevent contact with, or inhalation of volatiles, from contaminated groundwater.

RAOs for Environmental Protection

- Restore ground water aquifer to pre-disposal/pre-release conditions, to the extent practicable.
- Remove the source of ground or surface water contamination.

Soil

RAOs for Public Health Protection

- Prevent ingestion/direct contact with contaminated soil.
- Prevent inhalation of or exposure from contaminants volatilizing from contaminants in soil.

RAOs for Environmental Protection

- Prevent migration of contaminants that would result in groundwater or surface water contamination.

Soil Vapor

RAOs for Public Health Protection

- Mitigate impacts to public health resulting from existing, or the potential for, soil vapor intrusion into buildings at a site.

SECTION 7: ELEMENTS OF THE SELECTED REMEDY

The alternatives developed for the site and the evaluation of the remedial criteria are presented in the Alternative Analysis. The remedy is selected pursuant to the remedy selection criteria set forth in DER-10, Technical Guidance for Site Investigation and Remediation and 6 NYCRR Part 375.

The selected remedy is a Conditional Track 1 remedy.

The selected remedy is referred to as the Excavation, Soil Vapor Extraction, Groundwater Treatment and Vapor Mitigation remedy.

The elements of the selected remedy, as shown in Figures 2 through 5, are as follows:

1. Remedial Design

A remedial design program will be implemented to provide the details necessary for the construction, operation, optimization, maintenance, and monitoring of the remedial program. Green remediation principles and techniques will be implemented to the extent feasible in the design, implementation, and site management of the remedy as per DER-31. The major green remediation components are as follows:
remediation components are as follows:

- Considering the environmental impacts of treatment technologies and remedy stewardship over the long term;
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- Reducing waste, increasing recycling and increasing reuse of materials which would otherwise be considered a waste;
- Maximizing habitat value and creating habitat when possible;
- Fostering green and healthy communities and working landscapes which balance ecological, economic and social goals;
- Integrating the remedy with the end use where possible and encouraging green and sustainable re-development; and
- Additionally, to incorporate green remediation principles and techniques to the extent feasible in the future development at this site, any future on-site buildings will include, at a minimum, a 20-mil vapor barrier/waterproofing membrane on the foundation to improve energy efficiency as an element of construction.

2. Excavation

Excavation and off-site disposal of contaminant source areas, including**:**

- soils which exceed the protection of groundwater soil cleanup objectives (PGWSCOs), as defined by 6 NYCRR Part 375-6.8 for those contaminants found in site groundwater above standards; and;
- soils that create a nuisance condition, as defined in Commissioner Policy CP-51 Section G.

Excavation and off-site disposal of all on-site soils which exceed unrestricted SCOs, as defined by 6 NYCRR Part 375-6.8. If a Track 1 cleanup is achieved, a Cover System will not be a required element of the remedy.

Excavation and removal of any underground storage tanks (USTs), fuel dispensers, underground piping or other structures associated with a source of contamination.

Approximately 4,500 cubic yards of contaminated soil will be removed from the site. This includes approximately 4 feet of soil site-wide and individual hot spots ranging from 7 feet below ground surface (bgs) to 36 feet bgs. In addition, soil will be excavated to 25 feet bgs site-wide for development purposes.

3. Backfill

On-site soil which does not exceed the above excavation criteria or the protection of groundwater SCOs for any constituent may be used anywhere beneath the cover system, including below the water table, to backfill the excavation or re-grade the site.

Additionally, clean fill meeting the requirements of 6 NYCRR Part 375-6.7(d) may be brought in to replace the excavated soil or complete the backfilling of the excavation and establish the designed grades at the site.

4. Soil Vapor Extraction (SVE)

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5. In-Situ Chemical Reduction

In-situ chemical reduction will be implemented to treat VOCs in groundwater. Zero valent iron will be directly added to the bottom of the excavation at the groundwater interface to address groundwater contamination at source areas. Zero-valent iron will also be injected into the subsurface to form a vertical permeable reactive barrier (PRB) near the downgradient boundaries of the site to destroy contaminants leaving the site. The method and depth of injection will be determined during the remedial design.

Monitoring of VOCs will be required and conducted in the former source areas, and upgradient and downgradient of the PRB located near the downgradient boundary of the site.

6. In-Situ Chemical Oxidation

In-situ chemical oxidation (ISCO) will be implemented to treat VOCs in groundwater. A chemical oxidant, sodium permanganate, will be injected into the subsurface to destroy the contaminants in two transects located near the northern border of the site where PCE is elevated in the groundwater. The method and depth of injection will be determined during the remedial design. Additional data will be collected during design development.

Prior to the full implementation of this technology, additional laboratory scale studies (soil oxidant demand) will be conducted and additional geochemical data will be collected to more clearly define design parameters.

7. Vapor Mitigation

Any on-site buildings will be required to have a sub-slab depressurization system, or other acceptable measures, to mitigate the migration of vapors into the building from the subsurface. Since this is expected to be a BCP Conditional Track 1 cleanup, the system and any vapor intrusion monitoring must no longer be needed within 5 years of the date of the Certificate of Completion or the remedy would result in a Track 4 Restricted Residential cleanup.

8. Local Institutional Controls

If no EE or SMP is needed to achieve soil, groundwater, or soil vapor remedial action objectives, then the following local use restriction will be relied upon to prevent ingestion of groundwater:

Article 141 of the NYCDOH code, which prohibits potable use of groundwater without prior approval.

Conditional Track 1

The intent of the remedy is to achieve a Track 1 unrestricted use, therefore, no environmental easement or site management plan is anticipated. If groundwater standards are not achieved, or if the soil vapor intrusion (SVI) evaluation is not completed, prior to completion of the Final Engineering Report, then a Site Management Plan (SMP) and Environmental Easement (EE) will be required to address the groundwater remedy elements and SVI evaluation and implement actions as needed. A Track 1 cleanup can only be achieved if the groundwater treatment system, SVI mitigation system or other required action is no longer needed within 5 years of the date of the Certificate of Completion (COC).

In the event that Track 1 unrestricted use is not achieved, including achievement of groundwater and soil vapor remedial objectives, the following contingent remedial elements will be required and the remedy will achieve a Track 4 restricted residential cleanup.

Contingent Remedial Elements

9. Cover System

A site cover will be required to allow for restricted residential use of the site in areas where the upper two feet of exposed surface soil will exceed the applicable soil cleanup objectives (SCOs). Where a soil cover is to be used it will be a minimum of two feet of soil placed over a demarcation layer, with the upper six inches of soil of sufficient quality to maintain a vegetative layer. Soil cover material, including any fill material brought to the site, will meet the SCOs for cover material for the use of the site as set forth in 6 NYCRR Part 375-6.7(d). Substitution of other materials and components may be allowed where such components already exist or are a component of the tangible property to be placed as part of site redevelopment. Such components may include, but are not necessarily limited to pavement, concrete, paved surface parking areas, sidewalks, building foundations and building slabs.

10. Institutional Control

Imposition of an institutional control in the form of an environmental easement for the controlled property which will:

- require the remedial party or site owner to complete and submit to the Department a periodic certification of institutional and engineering controls in accordance with Part 375-1.8 (h)(3);
- allow the use and development of the controlled property for restricted residential use as defined by Part 375-1.8(g), although land use is subject to local zoning laws;
- restrict the use of groundwater as a source of potable or process water, without necessary water quality treatment as determined by the NYSDOH or NYCDOH; and
- require compliance with the Department approved Site Management Plan.

11. Site Management Plan

A Site Management Plan is required, which includes the following:

1. An Institutional and Engineering Control Plan that identifies all use restrictions and engineering controls for the site and details the steps and media-specific requirements necessary to ensure the following institutional and/or engineering controls remain in place and effective:

   Institutional Controls: The environmental easement described in paragraph 10 above.

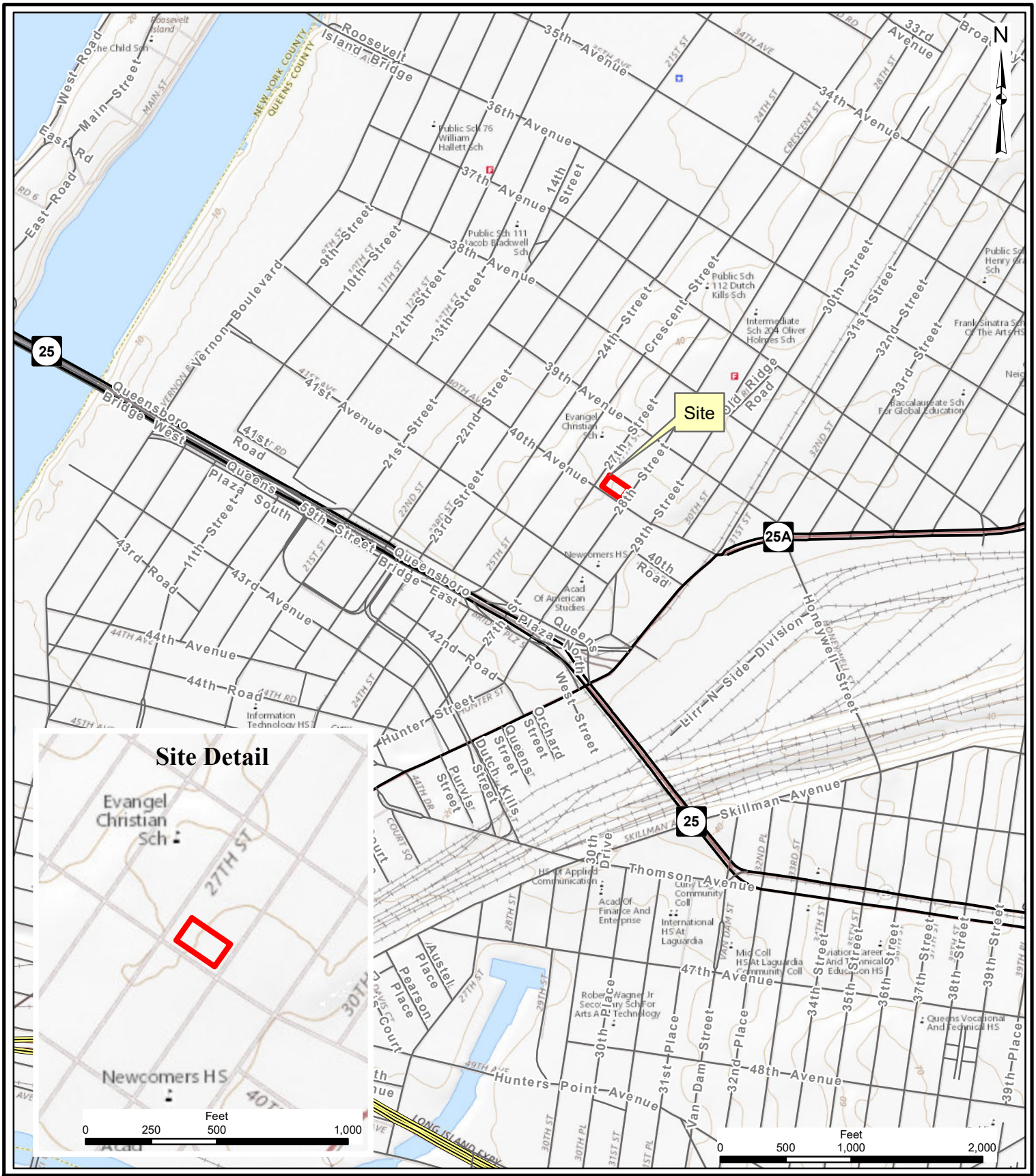
   Engineering Controls: The soil vapor extraction (paragraph 4), sub-slab depressurization system (paragraph 7) and cover system (paragraph 9) described in the paragraphs noted above.

This plan includes, but may not be limited to:

- an Excavation Plan which details the provisions for management of future excavations in areas of remaining contamination;
- descriptions of the provisions of the environmental easement including any land use and groundwater use restrictions;
- a provision that should a building foundation or building slab be removed in the future, a cover system will be placed in any areas where the upper two feet of exposed surface soil exceed the applicable soil cleanup objectives (SCOs);
- provisions for the management and inspection of the identified engineering controls;
- maintaining site access controls and Department notification; and
- the steps necessary for the periodic reviews and certification of the institutional and/or engineering controls.

2. a Monitoring Plan to assess the performance and effectiveness of the remedy. The plan includes, but may not be limited to:
   - monitoring of groundwater and soil vapor to assess the performance and effectiveness of the remedy;
   - a schedule of monitoring and frequency of submittals to the Department;

3. an Operation and Maintenance (O&M) Plan to ensure continued operation, maintenance, optimization, monitoring, inspection, and reporting of any mechanical or physical components of the remedy. The plan includes, but is not limited to:
   - procedures for operating and maintaining the remedy;
   - compliance monitoring of treatment systems to ensure proper O&M as well as providing the data for any necessary permit or permit equivalent reporting;
   - maintaining site access controls and Department notification; and
   - providing the Department access to the site and O&M records.



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27-09 40th Ave Dutch Kills Realty LLC

Figure 1: Site Location Map

27-09 40th Avenue
Long Island City, New York

Source: NYS ITS GIS Orthos, New York City 2018 aerial photograph;
NYS Department of Transportation 2008 Roads Dataset

Drawn:	MO
Date:	8/13/2020
Scale:	As noted above
Project:	42038.00
Figure:	1

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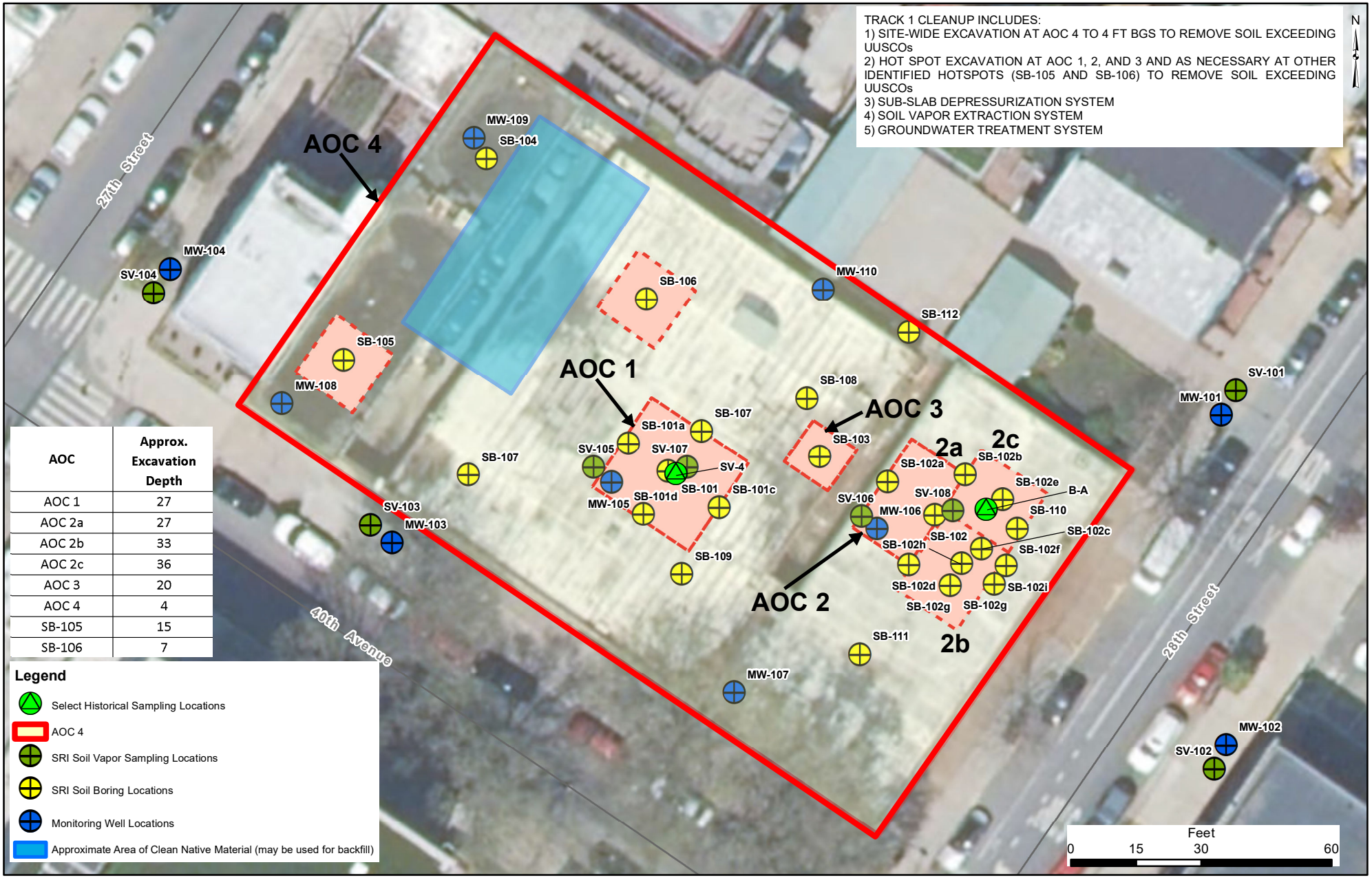
Site Location Map

27-09 40th Avenue
Long Island City, Queens
Site No. C241241



AOC	Approx. Excavation Depth
AOC 1	27
AOC 2a	27
AOC 2b	33
AOC 2c	36
AOC 3	20
AOC 4	4
SB-105	15
SB-106	7

Legend

- Select Historical Sampling Locations
- AOC 4
- SRI Soil Vapor Sampling Locations
- SRI Soil Boring Locations
- Monitoring Well Locations
- Approximate Area of Clean Native Material (may be used for backfill)

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Figure 3 - Approximate Depth of Excavation to Achieve Remedial Objectives

27-09 40th Avenue
Long Island City, New York

Source: NYS ITS GIS Orthos, New York City 2018 aerial photograph;
NYS Department of Transportation 2008 Roads Dataset

Drawn:	MO/CJL/BWF
Date:	1/12/2021
Scale:	1 inch equals 30 feet
Project:	42038.00
Figure:	16

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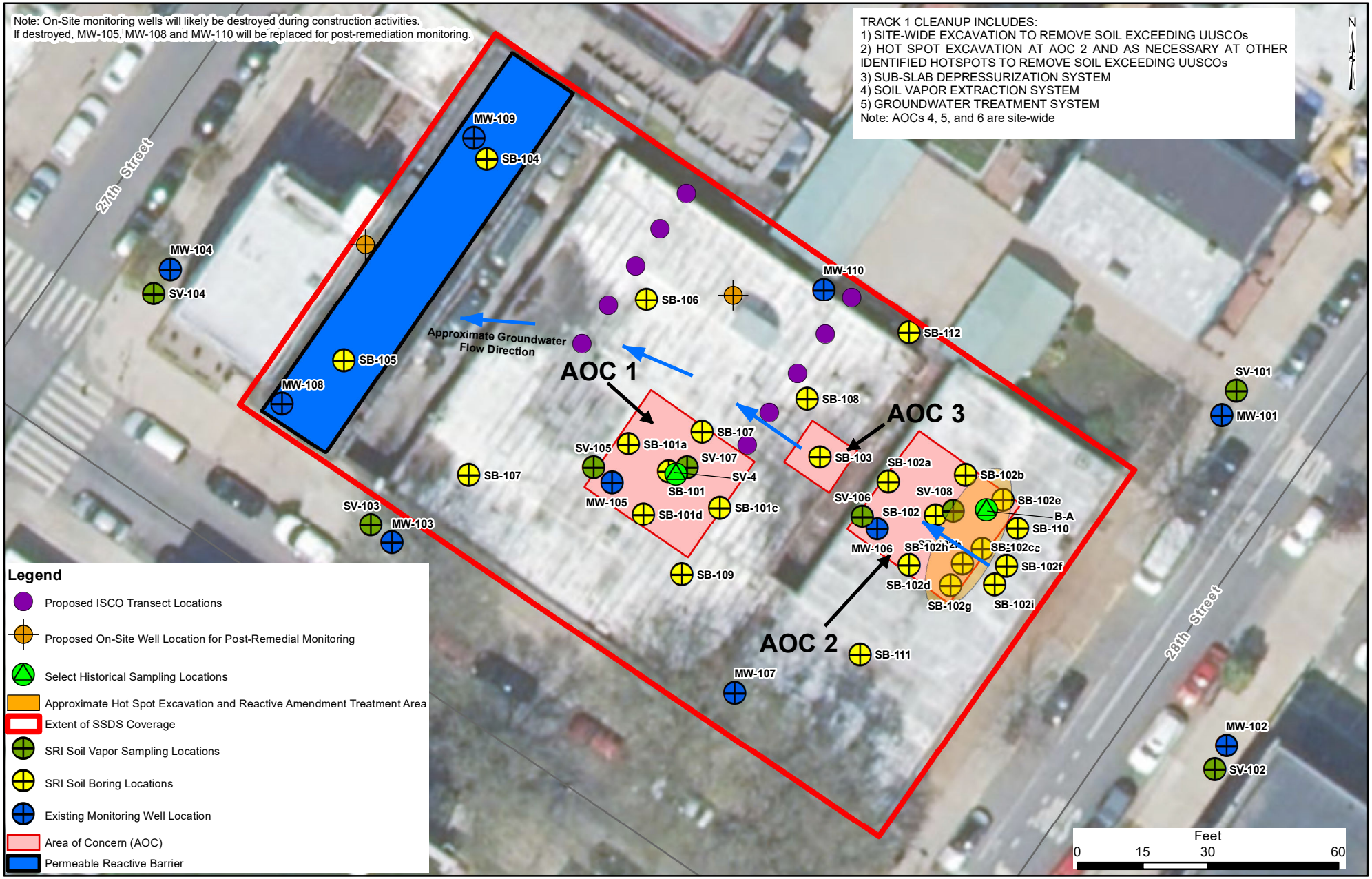

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Figure 4 - Conceptual Groundwater Treatment Plan

27-09 40th Avenue
Long Island City, New York

Source: NYS ITS GIS Orthos, New York City 2018 aerial photograph;
NYS Department of Transportation 2008 Roads Dataset

Drawn:	BWF
Date:	5/7/2021
Scale:	1 inch equals 30 feet
Project:	42038.00
Figure:	15

Document Path: Z:\projects\42000-42099\42038.00_27-09 40th Ave_BCP Consulting PE Services\GIS\Maps\Fig15 GW Treatment Plan.mxd

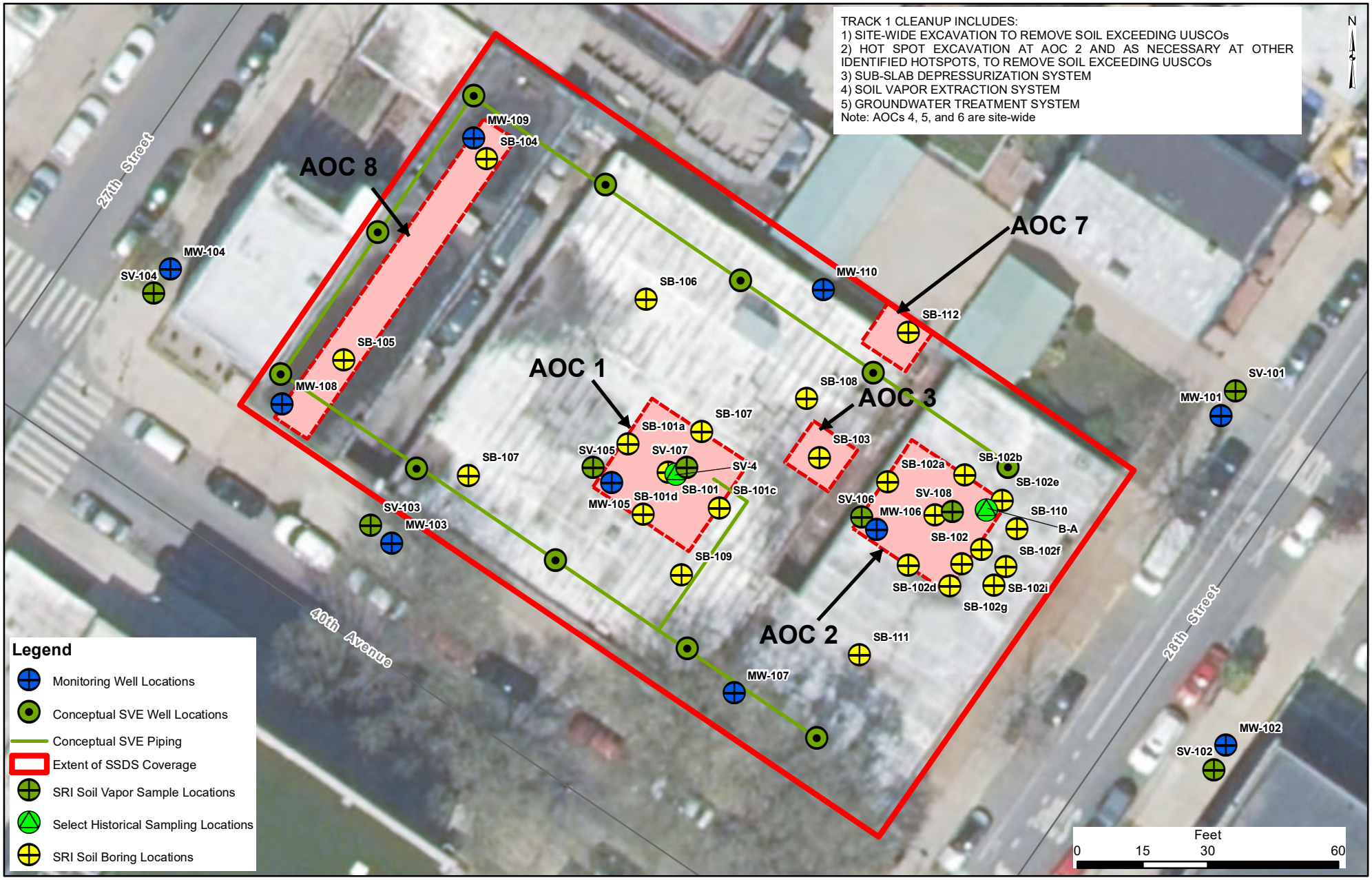

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Figure 5 - Conceptual Soil Vapor Extraction System Layout

27-09 40th Avenue
Long Island City, New York

Source: NYS ITS GIS Orthos, New York City 2018 aerial photograph;
NYS Department of Transportation 2008 Roads Dataset

Drawn:	MO/CJL
Date:	11/30/2020
Scale:	1 inch equals 30 feet
Project:	42038.00
Figure:	14

Document Path: Z:\projects\42000-42099\42038.00_27-09 40th Ave_BCP Consulting PE Services\GIS\Maps\Fig14SVE SystemLayout.mxd